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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/055,726 | 01/23/2002 | John R. Rhodes | SPE503/4-6CIPUS | 8318 |

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VINSON & ELKINS, L.L.P.
1001 FANNIN STREET
2300 FIRST CITY TOWER
HOUSTON, TX 77002-6760

| EXAMINER | |
|---|---|
| GAKH, YELENA G | |

| ART UNIT | PAPER NUMBER |
|---|---|
| 1743 | |

DATE MAILED: 11/17/2003

14

Please find below and/or attached an Office communication concerning this application or proceeding.

CL014

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 10/055,726 | RHODES, JOHN R. | |
| | Examin r | Art Unit | |
| | Yelena G. Gakh, Ph.D. | 1743 | |

-- Th MAILING DATE of this communication appears on the cover sheet with the correspond nce address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on *23 January 2002*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) *1-68* is/are pending in the application.

4a) Of the above claim(s) *1-27 and 58* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *28-57 and 59-68* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *23 January 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. §§ 119 and 120**

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

**Attachment(s)**

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *10,12,13*.
4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

## DETAILED ACTION

1. Restriction to one of the following inventions is required under 35 U.S.C. 121:

   I. Claims 1-27 and 58, drawn to a method removing nitrogen interference, classified in class 436, subclass 155.

   II. Claims 28-57 and 59-68, drawn to an apparatus for measuring the concentration of a substance, classified in class 422, subclass 78.

The inventions are distinct, each from the other because of the following reasons:

Inventions II and I are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus can be used in synthesis based on thermal oxidizing reaction.

Because these inventions are distinct for the reasons given above and have acquired a separate status in the art as shown by their different classification, restriction for examination purposes as indicated is proper.

2. During a telephone conversation with Avelyn R. Broughton on 11/10/03 a provisional election was made with traverse to prosecute the invention of Group II, claims 28-57 and 59-68. Affirmation of this election must be made by applicant in replying to this Office action. Claims 1-27 and 58 are withdrawn from further consideration by the examiner, 37 CFR 1.142(b), as being drawn to a non-elected invention.

### *Claim Rejections - 35 USC § 112*

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 28-57, 59-64 and 66-69 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for detecting oxidized or oxidized/reduced substance in a

sample, does not reasonably provide enablement for detecting the substance as it was originally present in the sample. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. Although the reduction step can be selective for reducing $NO_2$ to NO, the oxidation step results in oxidizing all compounds present in the sample to their oxides, and therefore no original substance will be present in the sample to be detected in the last step.

Claims 67-69 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for the sample containing nitrogen compounds, does not reasonably provide enablement for any other samples. The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims. To perform the step of selectively converting $NO_2$ in the sample to NO, nitrogen compounds should be present in the sample in the first place.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter, which the applicant regards as his invention.

6. Claims 28-57, 59-64, and 66-69 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

It is not clear, what exactly substance is detected in the last step of the method recited in the claims. It cannot be "the substance" that was present originally in the sample, as recited in claims 28-57 and 59-64, since the substance presented in the sample will be oxidized after the oxidation step; on the other hand, "a substance" recited in claims 66-69 is not a clear and definite term, since it is not apparent, which substance is meant here.

Claim 48 is incomplete and it is not clear, what "a first cap end and a second end cap" are referred to.

### *Claim Rejections - 35 USC § 103*

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. **Claims 28-37 and 40-57** are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan (US, 3,838,969, IDS) in view of Chand (US 3,622,488, IDS).

Dugan discloses an apparatus for measuring the concentration of a substance, comprising a thermal oxidizer, a removal device for selectively removing the nitrogen-containing interferant from the sample gas, and a detector: "in the apparatus the combustion zone 10 consists of a combustion chamber 12 and a combustion furnace 14. The combustion chamber is a quartz tube containing quartz wool, which acts as a baffle and provides additional high temperature contact surface for complete combustion of any stray fragments of the sample. The reduction zone 20 consists of a reduction chamber 22 and a reduction furnace 24. The reduction chamber is a quartz tube packed with 30 to 60 mesh copper" (col. 2, lines 12-20). The thermal oxidizer has a temperature control device, which maintains the temperature in the combustion chamber at 1080°-1150° C (col. 2, lines 55-57). The removal device, which is a thermal catalytic converter or a scrubber, since is removes nitrogen oxides from the sample, is temperature controlled, since it maintains the reduction chamber at 800°-850° C (col. 2, lines 66-68). The copper catalyst also works in the range 400°-650° C (col. 1, lines 20-25). While no specific temperature control of the converter is disclosed, it would have been obvious for anyone of ordinary skill in the art to use either one temperature controller for both pyrolyzer and converter, or separate controllers. While mesh copper is disclosed, any conventional form of a catalyst, such as turnings, wire, foil, or screen, are obvious for use in Dugan's apparatus. Also, it would have been obvious to use a

catalyst retainer of any type recited in claim 50, because this allows to decrease the amount of the catalyst used, comparing to the amount used for packing the quartz tube with the catalyst, as disclosed by Dugan. The housing comprises input and output tubes (Figure 1). While no specific material for these tubes is disclosed by Dugan, it inherently is thermostable and inert, with stainless steel conventionally used in pyrolysis.

Dugan does not specifically disclose a type of detectors; however, he indicates, "other methods of separation and detection of the gaseous oxidation products, after reduction of the oxides of nitrogen to nitrogen and reduction of the sulfur trioxide to sulfur dioxide may be employed" (col. 5, liners 23-26).

Chand teaches a method and apparatus for measuring sulfur dioxide concentrations "rapidly and continuously" with electrochemical cell detectors.

It would have been obvious for anyone of ordinary skill in the art to use electrochemical detection disclosed by Chand in Dugan's method, because it allows to measure sulfur oxides "rapidly and continuously" and can be used outside the laboratory, as emphasized by Chand (col. 1, lines 34-44).

10. **Claims 38-39 and 59-64** are rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Chand, as applied to claims 28-37 and 40-57 above, and further in view of Liu (Huanjing Huaxue).

Dugan in view of Chand does not disclose Mo catalyst for reducing $NO_2$ to NO. Liu discloses Mo catalyst for reducing $NO_2$ to NO.

It would have been obvious for anyone of ordinary skill in the art to modify Dugan-Chand's apparatus and method by using Mo catalyst instead of Cu reduction catalyst, because it specifically reduces $NO_2$ to NO and thus eliminated interference from $NO_2$.

11. **Claim 65** is rejected under 35 U.S.C. 103(a) as being unpatentable over Dugan in view of Liu and Rogers (US, 3,840,341).

Dugan discloses an apparatus for measuring the concentration of a substance, comprising a thermal oxidizer, a removal device for selectively removing the nitrogen-containing interferant from the sample gas, a conditioner, and a detector: "in the apparatus the combustion zone 10 consists of a combustion chamber 12 and a combustion furnace 14. The combustion chamber is a quartz tube containing quartz wool, which acts as a baffle and provides additional high

temperature contact surface for complete combustion of any stray fragments of the sample. The reduction zone 20 consists of a reduction chamber 22 and a reduction furnace 24. The reduction chamber is a quartz tube packed with 30 to 60 mesh copper" (col. 2, lines 12-20). The conditioner is a gas chromatographic column 30.

Dugan does not disclose molybdenum catalyst for reducing $NO_2$ to NO. Liu discloses Mo catalyst for reducing $NO_2$ to NO.

It would have been obvious for anyone of ordinary skill in the art to modify Dugan's apparatus by using Mo catalyst instead of Cu reduction catalyst, because it specifically reduces $NO_2$ to NO and thus eliminated interference from $NO_2$.

Dugan in view of Liu do not specifically disclose an on-line analyzer for measuring the amount of the substance in a fluid sample, comprising a sample injector with a pressure regulator and a flow restrictor.

Rogers discloses method and apparatus for an on-line organic carbon detection, comprising a sample injector with a metering valve to control the rate of a sample flow, a thermal oxidizer comprising a tube furnace 52 and a pyrolysis tube 54, a sample conditioner 68 for controlling the conditions of a resulted gas mixture, a detector 106 connected to and located downstream the sample conditioner and a programmable logic controller for calculating the concentration (col. 8, lines 60-68).

It would have been obvious for anyone of ordinary skill in the art to modify Dugan-Liu's apparatus for analyzing a fluid sample the way disclosed by Rogers, since Rogers' apparatus specifically designed for an on-line analysis of fluid samples.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Yelena G. Gakh, Ph.D. whose telephone number is (703) 306-5906. The examiner can normally be reached on 9:30 am - 6:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jill A. Warden can be reached on (703) 308-4037. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9310.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

Yelena G. Gakh
11/13/03